




# ISS-UF-2 Flight Readiness Review (FRR)
# International Space Station Program
# B. Dickey / ISS-UF-2 LPM
# May 16, 2002

# Agenda



- **Increment / Flight Overview** — **Bernestine Dickey**
- **Vehicle Readiness** — **Steven Porter**
  - **On-orbit Status**
  - **Elecktron Status**
  - **TVIS Status**
- **Avionics and Software Status** — **Not Presenting**
  - **Wireless Video System (WVS) (Prepositioned)**
  - **WVS External Transceiver Assembly (Prepositioned)**
  - **External Camera Group (Prepositioned)**
- **Payload Readiness** — **Benjamin Pawlik**
- **SSRMS Status** — **CSA/William Mackey**
- **UF-2 Summary** — **Bernestine Dickey**

# ISS-UF-2 Mission / Stage Overview
# International Space Station Program
# May 16, 2002


# Agenda



- ISSP UF-2 Program Reviews
- Increment 5 Overview
- UF-2 Stage Overview and Objectives
- UF-2 Flight Priorities
- UF-2 Significant Hardware
  - MPLM Configuration & Status
  - Middeck Status
- ISS UF-2 Consumables Status
- UF-2 Launch Commit Criteria


*OC/B. Dickey*


# ISSP UF-2 Program Reviews



**Launch Package Assessement (LPA) March 19, 2002**

- Addressed the launch package readiness for integration into the Orbiter
- Successfully completed and authorized to complete payload processing

**Stage Operations Readiness Review, May 7, 2002**

- Addressed CoFR 1&2 requirements for cargo elements and middeck stowed hardware; launch package; personnel, facilities and operations for their readiness to proceed to launch UF-2 on May 30, 2002.
- Authorized to proceed to launch of UF-2 with one exception and two action items. Exception has been closed and action items will be closed prior to launch.

**Action Items**:

1. Provide assessment of use of contingency TVIS Bungees for Increment 5. ECD 5-14-02
2. Present plans / launch dates for Service Module Acoustics Measures at the next NASA/RSA JPR.

**Exception:**

1. Roll Bias PPL uplinked on 5-9-02. -**CLOSED**

# INCREMENT 5

JUNE JULY AUG SEP OCT 2002

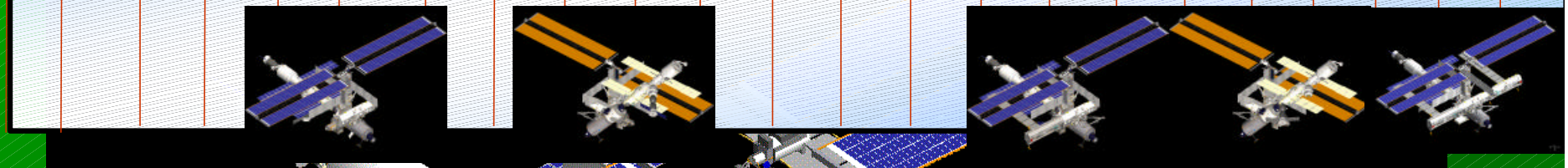
30 MAY — 30 MAY — UF-2 (MPLM)

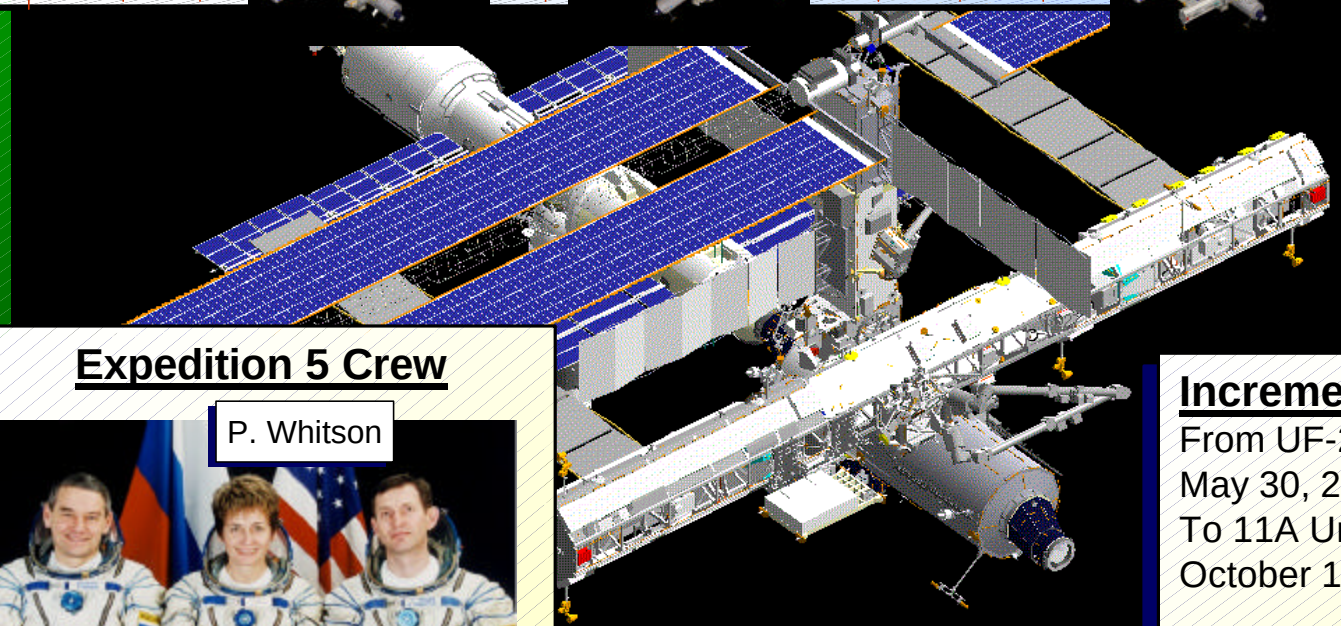
26 JUN — 8P

22 AUG — 9A (S1)

10 SEP — 9P

06 OCT — 14 OCT — 11A (P1)





## Expedition 5 Crew



P. Whitson

V. Korzun (Commander)

S. Treschev

Denotes EVA

## Increment 5

From UF-2 Launch
May 30, 2002
To 11A Undock
October 14, 2002

Duration – 137 Days
On-board ISS – 135 Days


# ISS UF-2 / STS 111
# Flight Priorities



## Major Flight Objectives (in priority order)

- Rotate Expedition 4 Crew with Expedition 5 Crew and Associated Handover Activities
- Transfer/ Return Middeck / MPLM Logistic/Payload Items
- Install, activate and checkout MBS
- Perform SSRMS Wrist Roll Joint  Transfer
- Install SMDP
- Install PDGF
- Perform SSRMS Wrist Roll Joint R&R
- Perform  Payload Experiment Activities

(Detailed task priorities included in back-up charts)


# Increment 5: Stage UF-2 Overview



## Stage Data

| UF-2 Undock Date: | Flight 9A Dock Date: | Duration: |
|---|---|---|
| June 9, 2002 | August 24, 2002 | 77 days |

## Crew

| Commander | Flight Engineer 1 | Flight Engineer 2 |
|---|---|---|
| Valeri Korzun | Peggy Whitson | Sergei Treschev |

## Stage Objectives

7 Progress Undock and 8 Progress Dock

Stow cargoes delivered by UF-2 and 8 Progress

Perform ISS Reboost

Prepare ISS and crew for S1 Assembly tasks on flight 9A

- SSRMS Checkout
- SSRMS Relocation
- EMU and Safer Checkout
- Prepack

Perform US and Russian Utilization

Installation of FGB Stowage Enclosures


# Increment 5: Stage UF-2 Overview



**Stage Objectives (concluded)**

Carbon Dioxide Removal Assembly (CDRA) ORU removal and replace

Internal Thermal Control System (ITCS) activities (TBR)

Perform 2 Russian EVAs using Orlan suits and Docking Compartment

Perform US and Russian SDTOs


# Previous Stage/Flight Support to UF-2 Readiness



**UF-1 Stage**

- Strela Relocation from PMA-1 to DC-1 to make room at SMDP stowage location site

**8A**

- CCS R2 Software Upload For MBS operations
- S0 & MT installation and checkout for MBS installation and ops
- MT Translation tests to prepare for MBS installation and Ops
- Install Trailing Umbilical System for MBS installation and ops
- Pre-position EVA hardware to prep for UF-2 EVAs

**8A Stage**

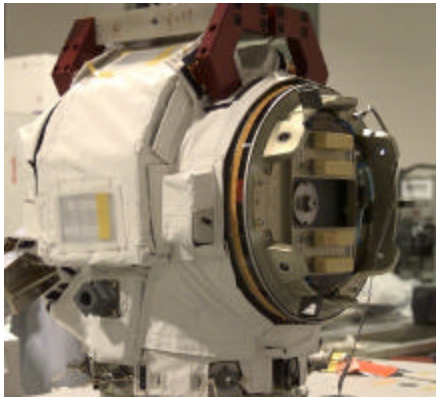
- Pre-packing for Transfer Operations on UF-2
  a. ZSR relocation / rearrangement / packing
  b. Tag-up meetings with Expedition 5 and UF-2 Crew
- EVA Preparation
  a. EMU Checkout
  b. EVA prepacking
  c. Airlock configuration
  d. Battery charging
- Complete SSRMS checkout (5-28-02)
- Modify K-bars to accept EXPRESS Rack


*OC/B. Dickey*

# Significant UF2 Hardware

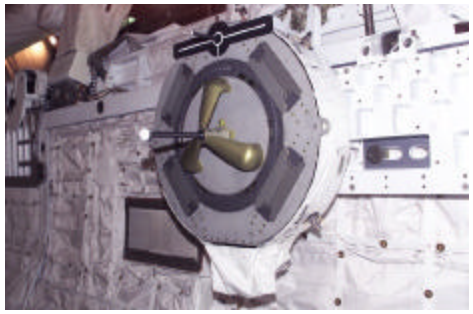
MPLM FM1 - Leonardo

Service Module Debris Panels (SMDPs)
- Sidewall Carrier



SSRMS Wrist Roll Joint
- Active/Passive FRAM

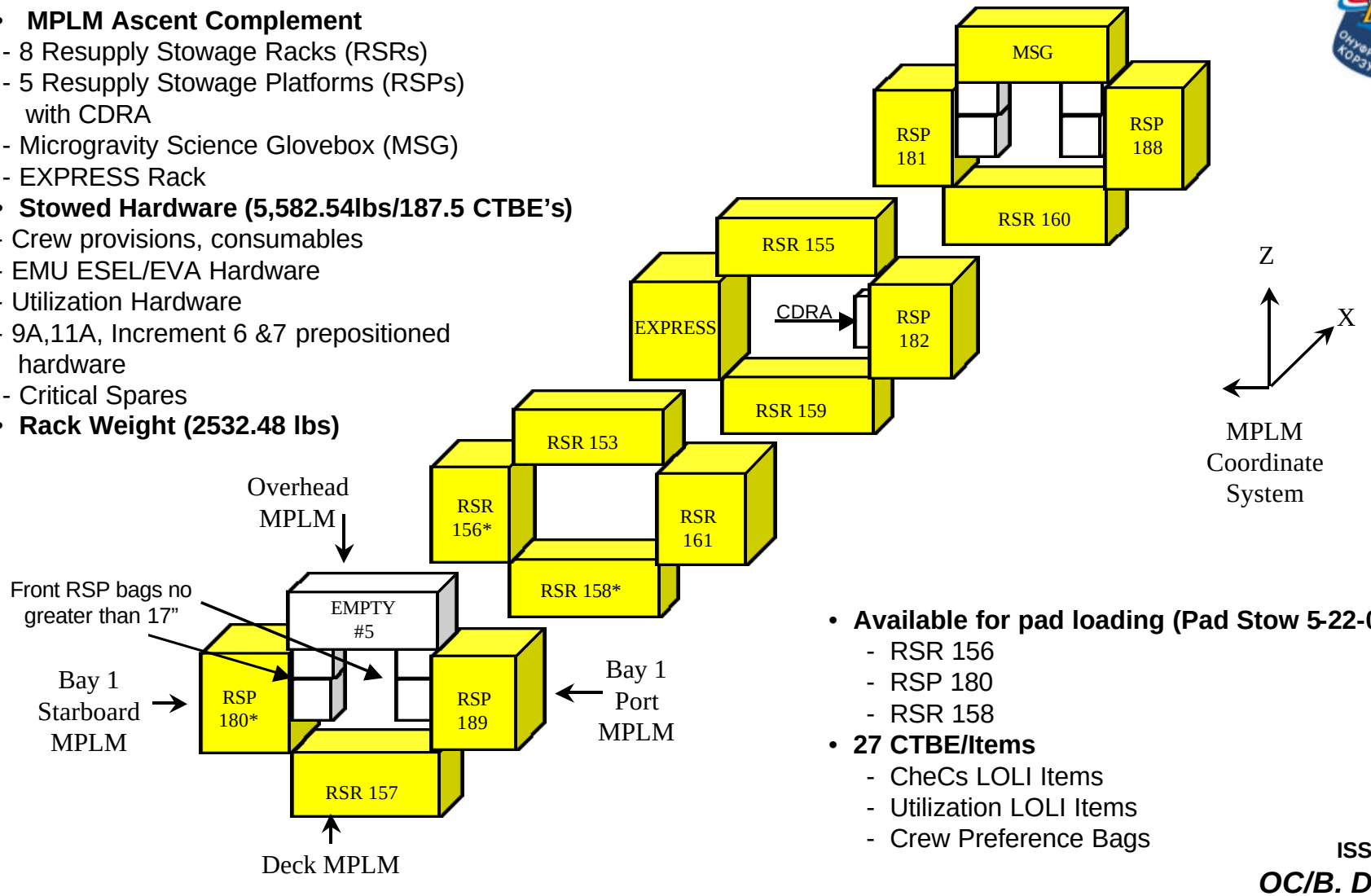
Mobile Remote Servicer Base System (MBS)



Payload Data Grapple Fixture (PDGF)
- ICAPC

# UF-2 MPLM Rack Configuration
# Ascent

- **MPLM Ascent Complement**
  - 8 Resupply Stowage Racks (RSRs)
  - 5 Resupply Stowage Platforms (RSPs) with CDRA
  - Microgravity Science Glovebox (MSG)
  - EXPRESS Rack
- **Stowed Hardware (5,582.54lbs/187.5 CTBE's)**
  - Crew provisions, consumables
  - EMU ESEL/EVA Hardware
  - Utilization Hardware
  - 9A,11A, Increment 6 &7 prepositioned hardware
  - Critical Spares
- **Rack Weight (2532.48 lbs)**




- **Available for pad loading (Pad Stow 5-22-02)**
  - RSR 156
  - RSP 180
  - RSR 158
- **27 CTBE/Items**
  - CheCs LOLI Items
  - Utilization LOLI Items
  - Crew Preference Bags



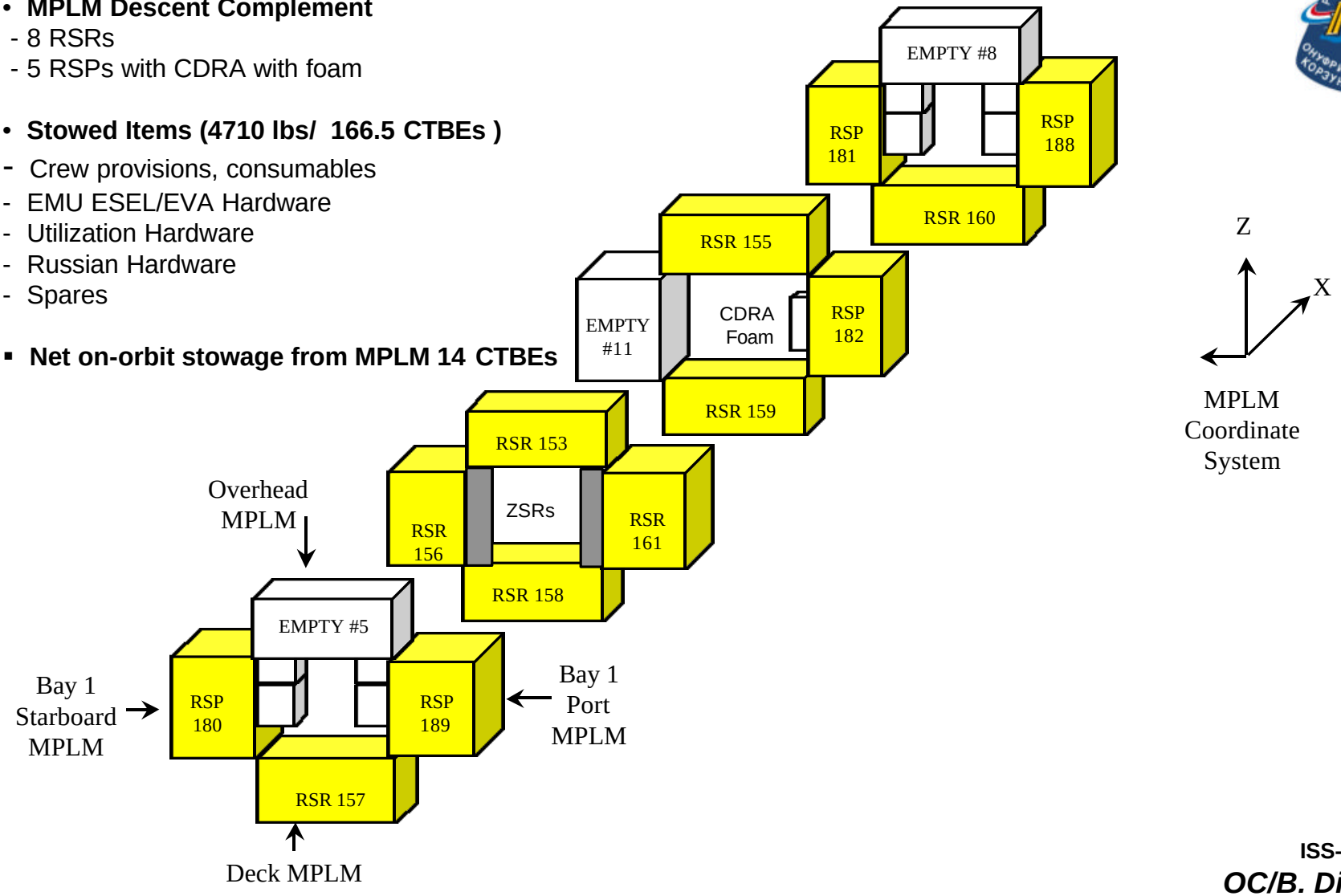
***OC/B. Dickey***

# UF-2 MPLM Rack Configuration
# Descent

- **MPLM Descent Complement**
  - 8 RSRs
  - 5 RSPs with CDRA with foam

- **Stowed Items (4710 lbs/ 166.5 CTBEs )**
  - Crew provisions, consumables
  - EMU ESEL/EVA Hardware
  - Utilization Hardware
  - Russian Hardware
  - Spares

- **Net on-orbit stowage from MPLM 14 CTBEs**



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# Middeck Significant Hardware & Status



## Middeck Significant Hardware

- Docking Mechanism
- Crew Rotation Items
  - Recumbent Seats
  - IELKs
  - ACES
  - AMP & ALSP
- Water Transfer Equipment
- ESEL EMU
- ESEL Tools
- PCS and Associated Equipment
- MBS Equipment
- Utilization Hardware
- Photo TV Hardware

## Status

**Middeck Late Load** **L-10 day (May 20, 2002)**

- Interface Umbilical Assembly (IUA)
- Artic Dual Freezer Water Line Assembly
- Standard Card Carrier & Cards


# Consumables Status



**All consumables have been reviewed and are healthy for the UF-2 flight and stage**

- ISS propellant reserve requirement is met
- Food is above skip cycle
- EDV, KTO and SEC requirements are met
- LiOH is above skip cycle (Backup to VOZDUKH and CDRA)
- Crew provisioning requirements are met
- Water is maintained above skip cycle throughout the stage.
- Oxygen
  - Elektron is the primary source of oxygen
  - Cassettes (SFOGs – oxygen candles) can provide 49 days as of 5/13/02 (GMT 133). Currently burning 1 candle per day/crew. Developing optimum O2 conservation and replenishment strategy.
  - Airlock can provide additional 47 days assuming UF-2 replenishes the EVA use and protect for redline (stabilizing injured crewmember)

Note: Russians are performing troubleshooting and testing - leak and electrical of the Elektron


# Launch Commit Criteria



## Stage Readiness Requirements

- Generic Redundancy Requirements for SSRMS and MPLM
  (SSRMS checkout complete by 5-28-02)

## Flight Specific Cargo Element

- None


# UF-2 H/W Constraints That Affect Launch Hold Capability



## MPLM Launch Scrub Requirements

| | |
|---|---|
| - ADVASC-GC | 14 days * |
| - ADVASC-SS | 23 days |
| - CHeCS | 30 days |
| - MEPs | 14 days |

* This requirement will result in a joint operational activity to install and activate the H/W in the appropriate EXPRESS rack on-orbit if there is a launch slip of more than 5 days.

# Vehicle Office

## UF-2

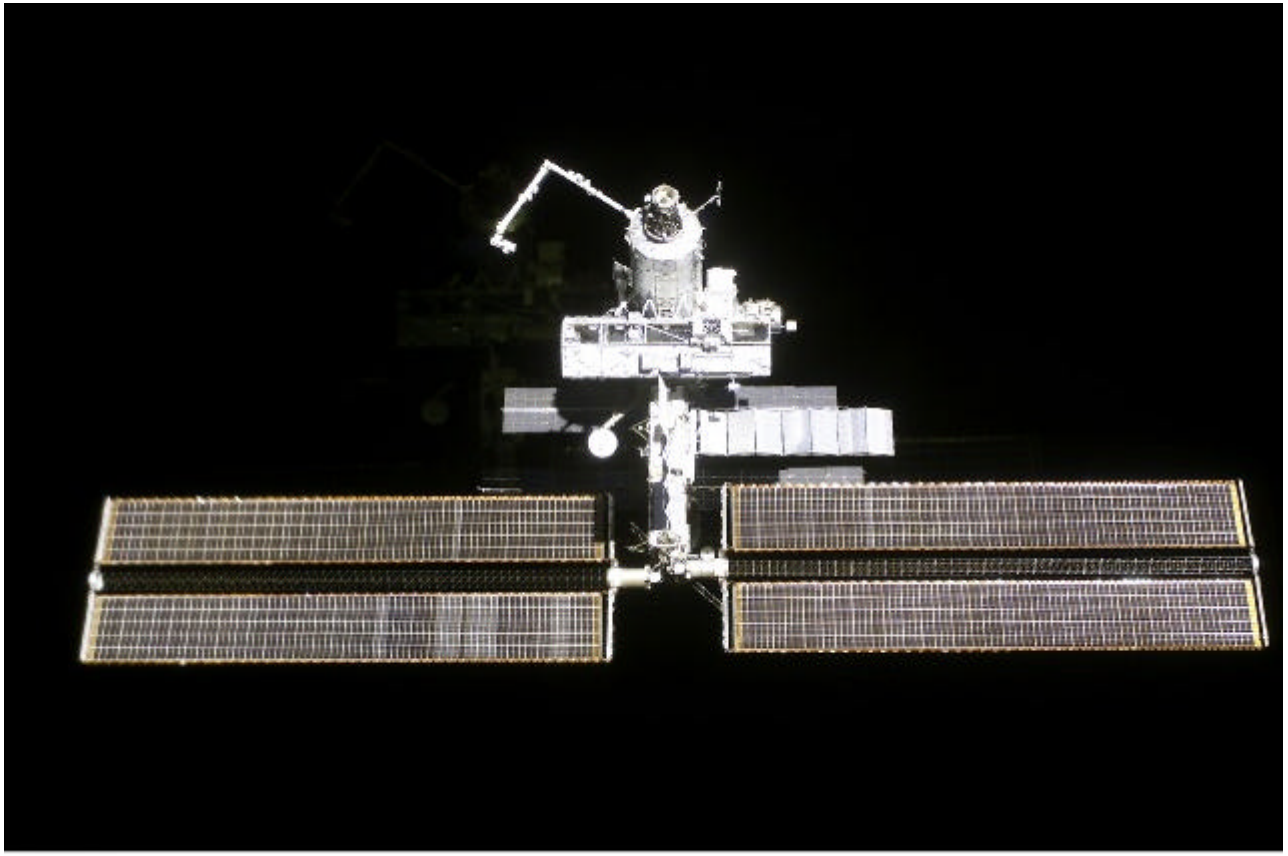

## Flight Readiness Review
## May 16, 2002

# AGENDA

**1. On-Orbit Vehicle Readiness** — **S. Walker**

a. Elektron
**b. ITCS Water Chemistry**
**c. MT TUS IUA Safing Bolt**
**d. MT Auto Sequences**

# Flight 8A Configuration



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# Hardware Status
## (Recent Developments)

| Issues | New Since 8A FRR | Impact to UF-2 Operations | Topic to be Presented | Additional Ground Testing or Open Work | On-Orbit Repair scheduled or required |
|---|---|---|---|---|---|
| Elektron Failure | Yes | No | Yes | Yes | Yes |
| ITCS Contamination | Yes | No | Yes | Yes | TBR |
| MT TUS IUA Safing Bolt | Yes | Yes | Yes | Yes | R&R in work |
| MT Auto Sequences | Yes | No | Yes | Yes | Software Patch planned |
| ORCA Life Mgmt. | Yes | No | No | Yes | No |
| USOS Battery Pressures | Yes | No | No | Yes | No |
| SM Kurn Intermittent Failure | Yes | No | No | Yes | No |
| GPS System Online | Yes | No | No | No | No |
| CFU Operations | Yes | No | No | No | No |
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# Hardware Status
## (On-Going Issues)

| Issues | New Since 8A FRR | Impact to UF-2 Operations | Topic to be Presented | Additional Ground Testing or Open Work | On-Orbit Repair scheduled or required |
|---|---|---|---|---|---|
| SSRMS WR | No | Yes | Yes CSA | No | Yes |
| BGA Rotation High Current | Yes | No | No | No | No |
| Metox | No | No | No | Yes | No |
| TVIS | No | No | No | Yes | No |
| MCA Operations | No | No | No | No | Yes |
| CMG-Outer Current Spikes, Loss of Comm **NO LONGER AN ISSUE** | Yes | No | No | No | No |
| **RPCM Health Flags** | Yes | No | No | No | No |
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# What is Out of Configuration

- Three RPCMs that cannot be refreshed - no impact
- Node 1 Smoke Detector #2 Off – no impact
  - Awaiting troubleshooting to determine failure cause
- CDRA operates on single bed - no impact
- MCA has limited life – Mass Spectrometer and Verification Gas Assembly to be R&R'd
- TVIS – temporarily have restricted operations to less than 6 mph
- EEATCS starboard radiator - one loop plumbed incorrectly - no impact
- 1 of 4 Beta Gimbal Assembly (BGA) latching mechanisms not locked on starboard 4 bar assembly - no impact
- SM rapid depress algorithm disabled - no impact (Lab provides function)
  - Russians currently enabling the algorithm during the crew day
- Vozdukh operating on 2 of 3 $CO_2$ beds - no impact to $CO_2$ removal
  - Second vacuum pump starting to fail; planning R&R
- SM ARCU #23 not operational – can work around power requirements for the time being. R&R of ARCU scheduled for May 14th

# Elektron Failure

- The Elektron appears to be hard failed.
- Russians suspect an avionics box failure, but troubleshooting and analysis still in work.
  - Spare avionics box on-orbit
  - Spare Elektron fluid unit may be manifested on 9P ( 9/10/02)
- With the Elektron failed, ISS depends on RS SFOG and US High Pressure Gas Tank for metabolic oxygen
- Crew breathes ~ 5 lb O2/day; ~3 SFOG candles required/day
  - As of 5/16, there are RS SFOG ~ 145 candles on board which would cover ~ 48 days
    - Replacement SFOGs will have to be manufactured
  - Post 8A High pressure oxygen tanks are full at 435 lbs
  - Progress 8P and 9P manifesting 110 lbs O2
  - ORCA currently has 100,000 remaining cycles of certified life which is ~100 lb of O2 transfer
    - Looking at possibility of extending ORCA life

# Elektron Failure (con't)

- Conclusion
  - There is available oxygen to support ISS past 9P including UF-2 and 9A EVAs with a failed Electron.
    - Detailed plan still in work with the Shuttle Program and the Russians
  - To support truss assembly EVAs, high pressure oxygen will have to be sufficiently replenished.
    - Impact will require more oxygen to be flown to ISS and require more ORCA use.
      - Working with Shuttle to optimize oxygen transfer plan per flight
      - Analyzing optimum high pressure gas tank pressure range to optimize EVA support and ORCA life.

**NO CONSTRAINTS TO UF-2 LAUNCH AND ON-ORBIT OPERATIONS**

# ITCS Contamination

- ITCS fluid samples have shown microbial growth and decreasing pH
- Silver Biocide filters were installed post UF-1
  - On-orbit fluid samples have indicated silver biocide filters working
  - Water samples returned on 8A show confirm on-orbit samples
  - Silver is likely damaging the h/w
- Have developed a kit for adjusting the pH level back to appropriate levels
- CO2 exchange between the cabin atmosphere and coolant has apparently reached equilibrium resulting in a pH of 8.4
  - The Coolant working group will consider whether pH 8.4 is acceptable

**NO CONSTRAINTS TO UF-2 LAUNCH AND ON-ORBIT OPERATIONS**

# Mobile Transporter (MT) Trailing Umbilical System (TUS) IUA Safing Bolt

- The safing bolt on the IUA MT TUS-2 cable cutter could not be deployed on 8A
  - The deployment of the safing bolt allows for IVA cutting of the TUS cable
- Plan is to safe the TUS-1 safing bolt during UF-2 (EVA 2) and leave the bolt safed until the TUS-2 problem understood
- Spare being flown on UF-2. Installation of the spare is still being worked
- Currently discussing the need to add a flight rule restricting MT translations to coincide with EVAs

NO CONSTRAINTS TO UF-2 LAUNCH AND ON-ORBIT OPERATIONS

# Mobile Transporter (MT) Auto Sequence Failures

- MT position sensor/software behavior interrupts MT auto-sequences, specifically the auto-latching of the MT.
- Manual MT commanding is required to complete auto-translations.
- Software can be updated to correct the problem.
  - Details of software fix still being worked.

NO CONSTRAINTS TO UF-2 LAUNCH AND ON-ORBIT OPERATIONS

# On-Orbit Summary

- **None of the identified items for investigation regarding the on-orbit configuration represent a constraint to the flight of UF-2**

- **The MER personnel and facilities will be ready to support**

Pending completion of the identified open and forward work, the Vehicle Office is ready To proceed with the UF 2 Launch and Stage On-Orbit Operations



# OZ / Space Station Payloads Office

# STS-111/UF2
# Flight Readiness Review
# May 17, 2002


Benjamin Pawlik,

Inc. 5 Payload Manager

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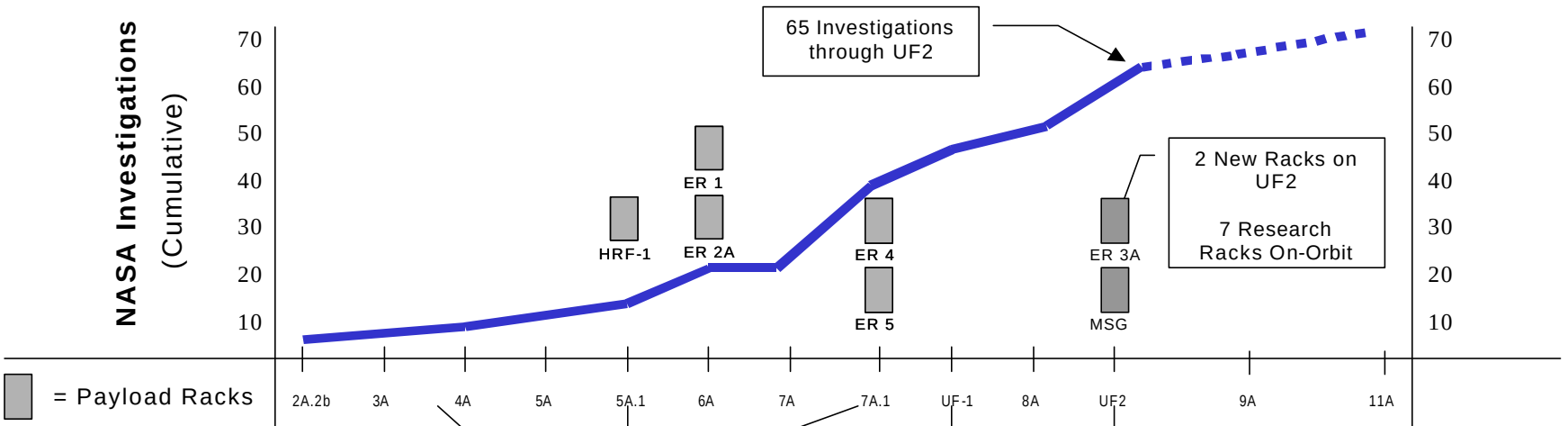
- Descent Manifest Requirements
- Late Manifest and Requirements Changes
- Open Work Burndown Chart
- Forward Work

# ISS Research Program Growth




= Payload Racks

**A** = Active Rack Isolation System
**ER** = EXPRESS Rack
**HRF** = Human Research Facility
**MLE** = Middeck Locker Equivalent
**MSG** = Microgravity Science Glovebox

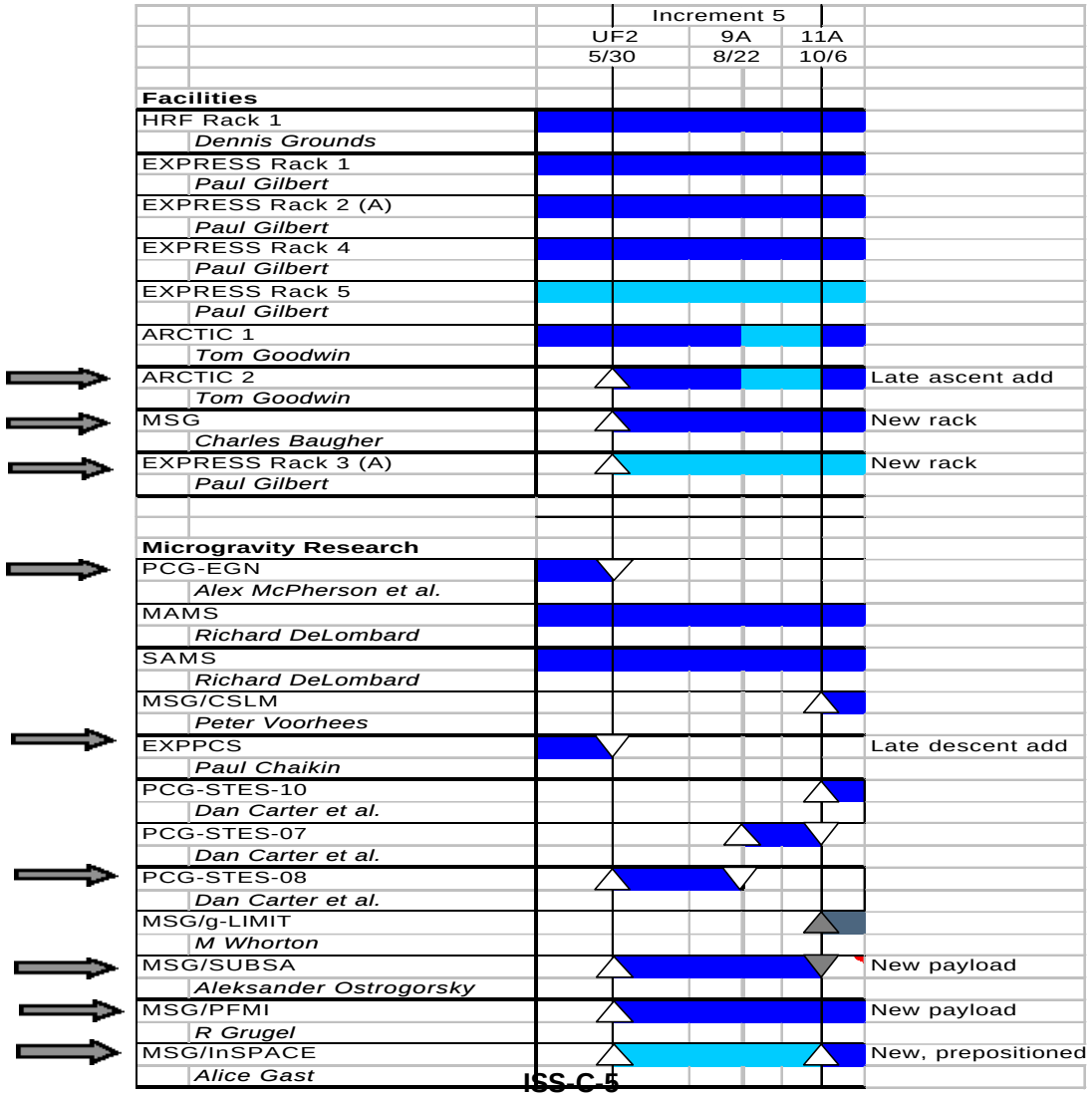
| | Incr 0 | Incr 1 | Incr 2 | Incr 3 | Incr 4 | Incr 5 |
|---|---|---|---|---|---|---|
| | |  | | | | |
| **Crew Time** (US/Russian) | 0/0 | 47/69 | 249/51 | 202/130 | 152/29 (thru 4/1/02) | 231/52 (timelined thru 11A) |
| **US Payload Runtime** (hours) | 800 | 1500 | 25,000 | 20,000 | 20,200 (thru 4/28/02) | 20,000 (forecast thru 11A) |
| **Mass to Orbit** (kg) | 98 (2A.2b)<br>0 (3A) | 2 (4A)<br>25 (5A) | 836 (5A.1)<br>1622 (6A)<br>51 (7A) | 1271 (7A.1) | 268 (UF1)<br>237 (8A) | 1601 (UF2)<br>300 (9A) |
| **Middeck Lockers** (MLE) | 4 | 1 | 8 | 7 | 12 | 8 (UF2) 9 (9A) |

**ISS-C-3**

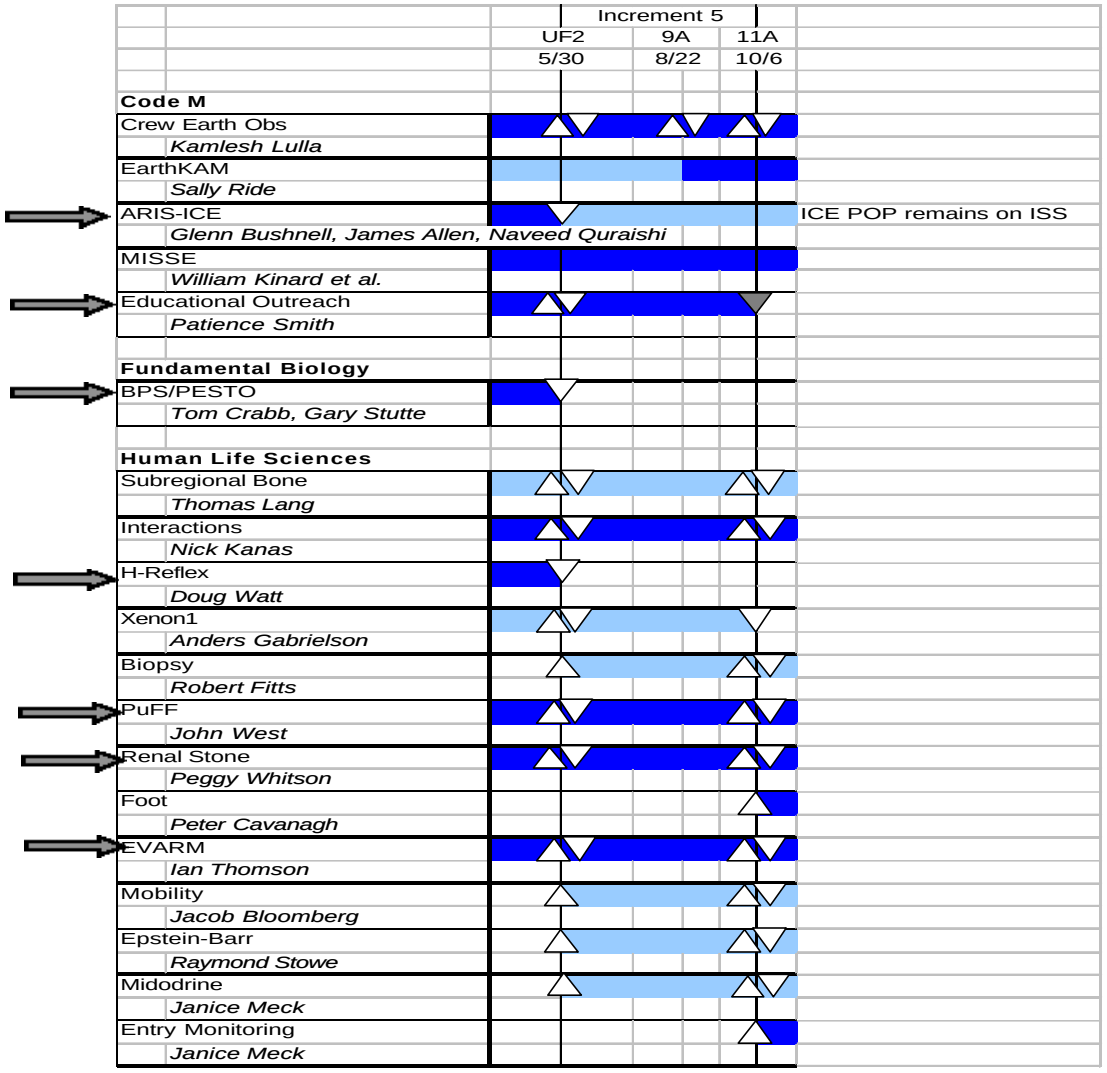
# On-Orbit Payload Status

- **Active US Science facilities**
  - **EXPRESS #1, EXPRESS #2, EXPRESS #4, HRF Rack (as scheduled), MCOR**
- **Completed 8A Stage US Payload Investigations**
  - **Code M: EARTHKAM, EPO**
  - **HLS: H-REFLEX, Renal Stone**
  - **MRP: ZCG, EXPPCS**
- **Ongoing 8A Stage US Payload Investigations**
  - **Code M: ARIS-ICE, CEO, MISSE**
  - **Fundamental Biology: BPS**
  - **HLS: Interactions, EVARM, PuFF**
  - **MRP: SAMS, MAMS, CGBA, CPCG-H, PCG-EGN**
- **8A Stage Payloads Impacting UF2**
  - **BTR partially failed and not usable for BPS or STELSYS. ARCTIC 2 to be used in its place for STELSYS**
  - **EVARM badge readings performed in preparation for UF2 joint operations**
  - **EXPPCS originally extended through Increment 5, but due to failure will return on UF2**
  - **Return hardware and samples include: ARIS-ICE, BPS, CPCG-H, CGBA, ZCG, PCG-EGN, HLS return, EXPPCS**

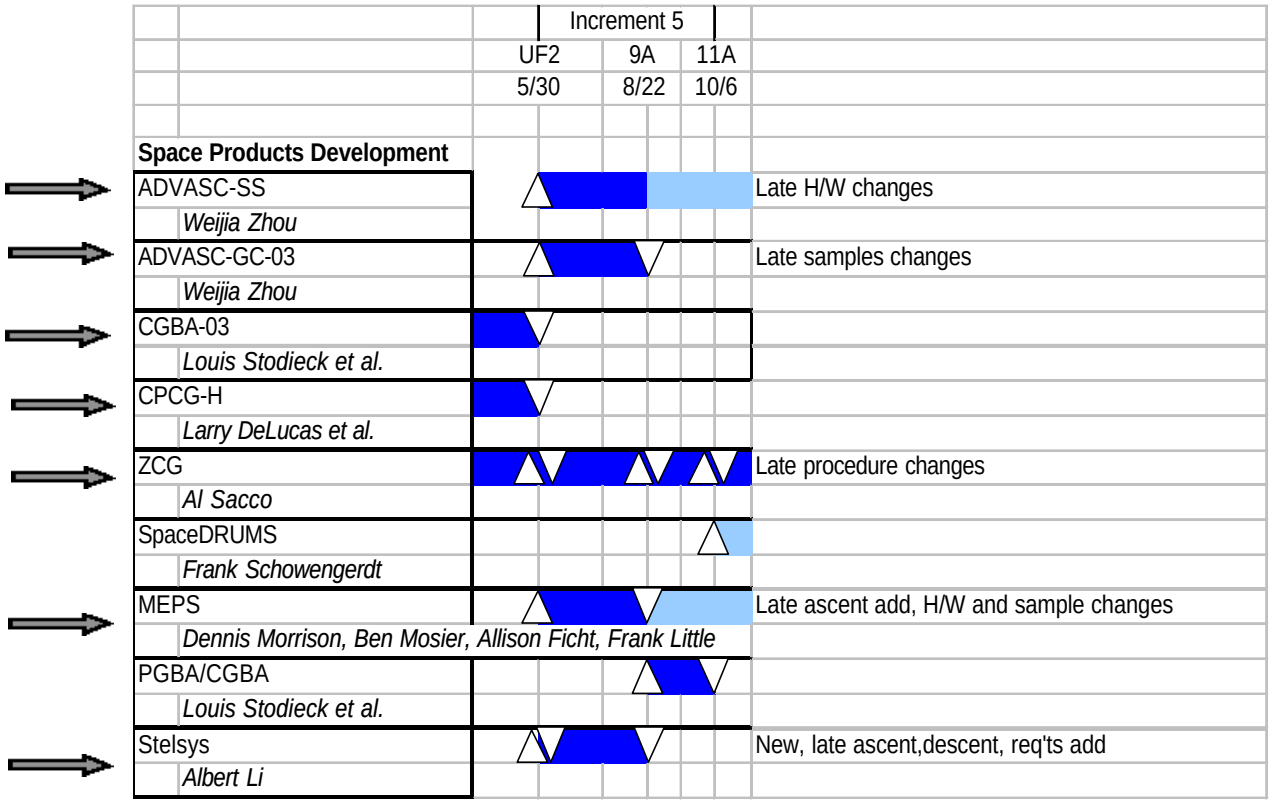
# Exp. 5 Research Program Overview



# Exp. 5 Research Program Overview



# Exp. 5 Research Program Overview



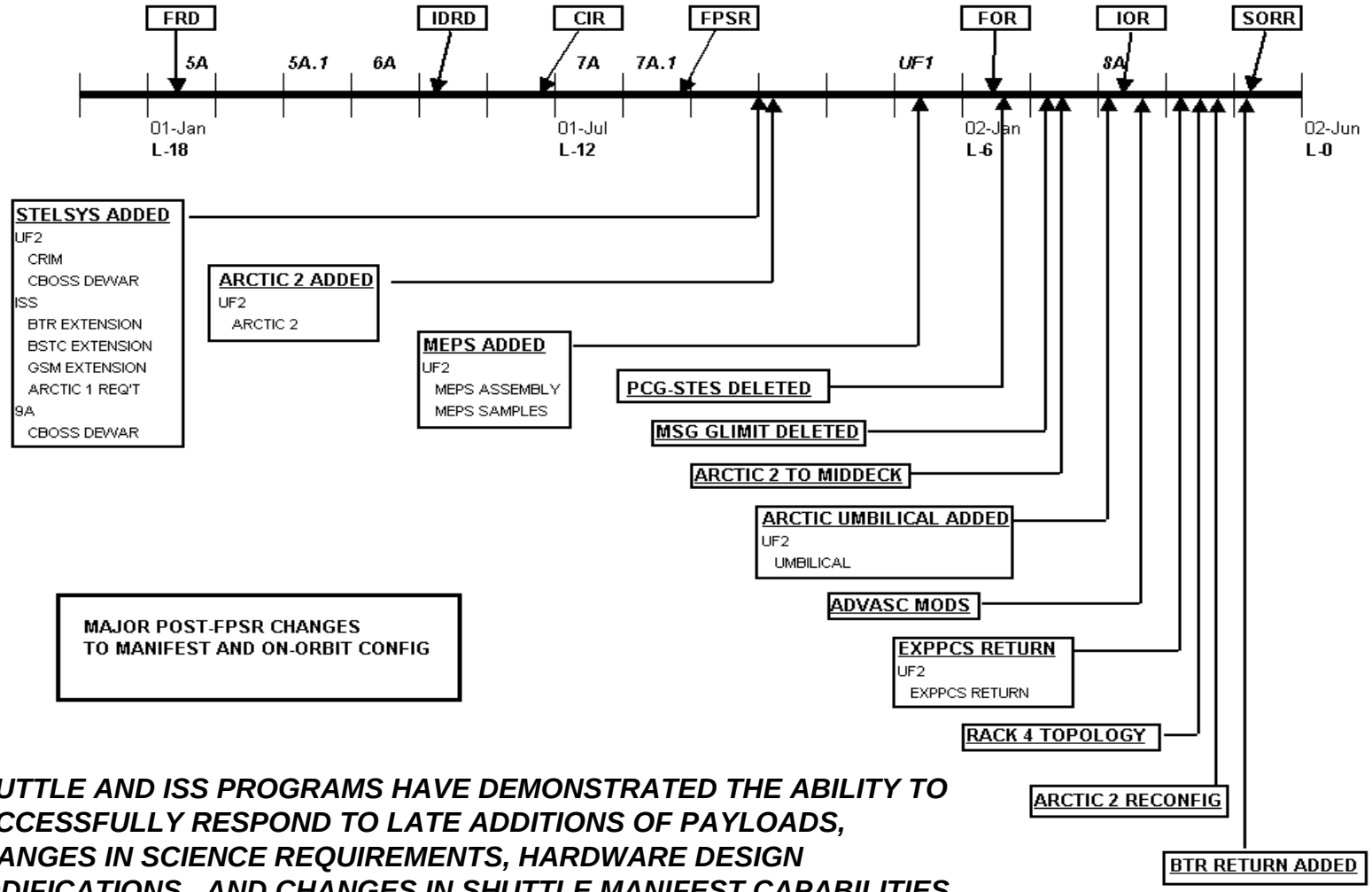
# Ascent Manifest

- **Ascent manifest requirements for transfer from Orbiter to ISS**
- **1601kg/3530lbs, 2 Racks, 33.1 CTBE, 8 MLE**
  - MDK - Powered (2 MLE)
    - Commercial Refrigerator Incubation Module - Commercial StelSys (CRIM-CS), Protein Crystal Growth - Single Thermal Enclosure System (PCG-STES) #8
  - MDK - Passive (6 MLE)
    - ARCTIC Freezer, Zeolite Crystal Growth-Sample Storage (ZCG-SS), KSC GN2 Freezer, Human Research Facility Potassium Citrate Kits (HRF K-Citrate), Biotechnology Cell Science Stowage – Commercial StelSys (BCSS-CS1) Cryodewar, ARCTIC Umbilical
  - MPLM
    - Microgravity Science Glovebox (MSG) Rack, EXPRESS #3 rack, Advanced Astroculture (ADVASC) Stowage 1-3, ADVASC Growth Chamber (ADVASC-GC), ADVASC Support Systems (ADVASC-SS), Education Payload Operations – 5 (EPO-5), Microencapsulation Electrostatic Processing System (MEPS) Samples and Assembly Unit, MSG Stowage (Investigating the Structure of Paramagnetic Aggregates from Colloidal Emulsions (InSPACE), Toward Understanding Pore Formation and Mobility (PFMI), Solidification Using Baffles in Sealed Ampoules (SUBSA)), Space Acceleration Measurement System (SAMS) Hardware, BCSS-CS1 Caddy, EXPRESS Support Hardware

# Descent Manifest

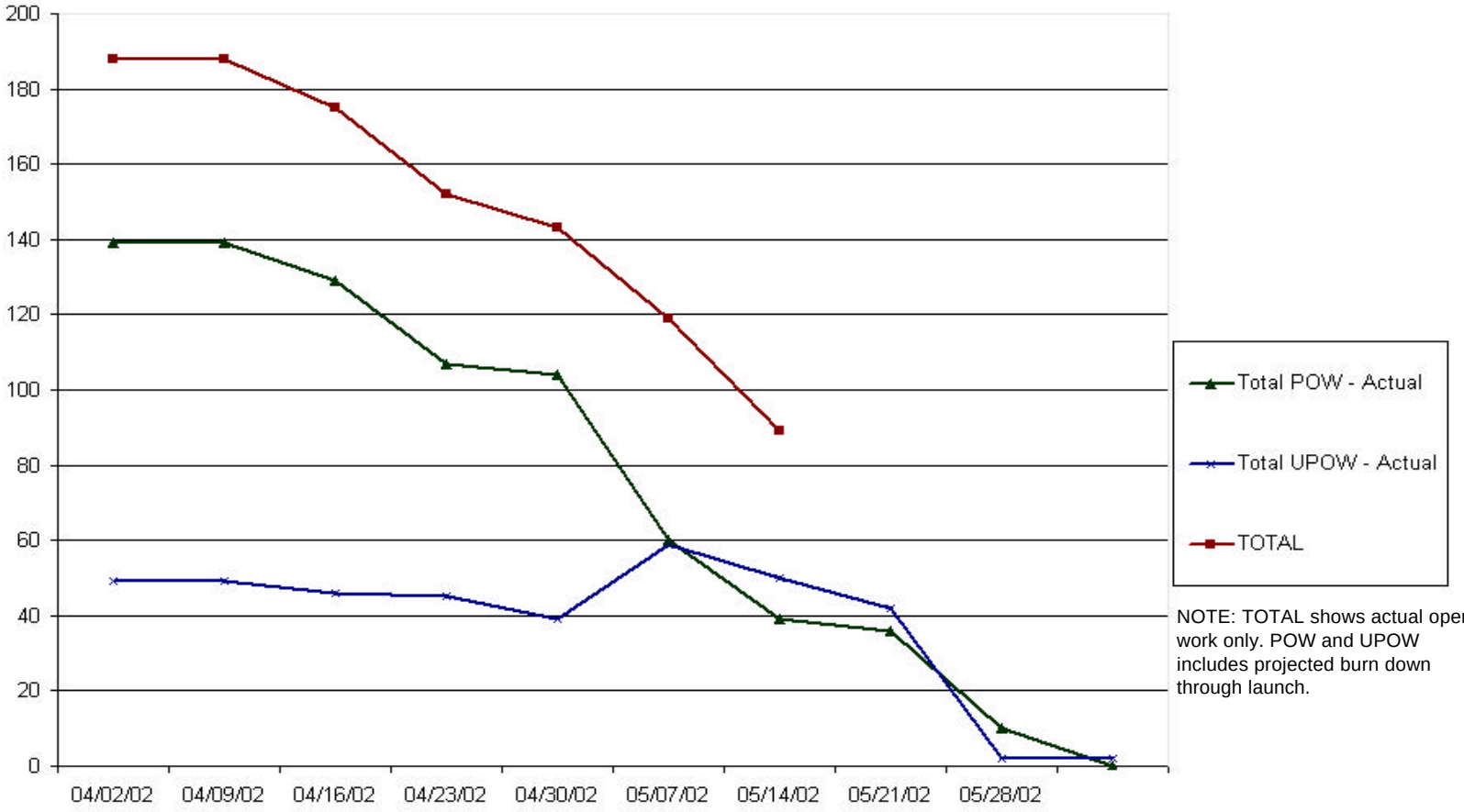
- **Descent manifest return requirements for transfer from ISS to Orbiter**
- **659kg/1453lbs, 13.7 CTBE, 12 MLE**
  - MDK - Powered (4 MLE)
    - Biomass Production System (BPS), Commercial Protein Crystal Growth - High Density (CPCG-H) #1, Commercial Generic Bioprocessing Apparatus (CGBA),
  - MDK - Passive Stowage (8 MLE)
    - KSC GN2 Freezer, BPS Ames Stowage Kit (ASK) 1-3, Zeolite Crystal Growth-Sample Storage (ZCG-SS), Protein Crystal Growth-Enhanced Gaseous Nitrogen (PCG-EGN) Dewar, HRF K-Citrate Kits, Pulmonary Function in Flight (PuFF) Data Kit and Electronic Media Kit, Biotechnology Refrigerator (BTR) (candidate only)
  - MPLM
    - CRIM-CS1, HRF Stowage, Personal Equipment Restraint System (PERS) Buckles, Physics of Colloids in Space Test Section (PCS-TS1), PCS Avionics Section (PCS-AS), Active Rack Isolation System – ISS Characterization (ARIS-ICE), BCSS Stowage, EPO-4, BPS Muffler

# Late Manifest and Requirement Changes




***SHUTTLE AND ISS PROGRAMS HAVE DEMONSTRATED THE ABILITY TO SUCCESSFULLY RESPOND TO LATE ADDITIONS OF PAYLOADS, CHANGES IN SCIENCE REQUIREMENTS, HARDWARE DESIGN MODIFICATIONS, AND CHANGES IN SHUTTLE MANIFEST CAPABILITIES***

# Open Work Burndown




NOTE: TOTAL shows actual open work only. POW and UPOW includes projected burn down through launch.

# Forward Work

- **ARCTIC umbilical replacement late delivery and Rack 4 topology changes**
  - Umbilical replacement KSC schedule to accommodate MDK stowage
    - HDW to KSC fit check: 5/17
    - HDW T/O KSC Utilization for servicing: 5/22
    - HDW T/O to KSC for packing and installation: 5/24
  - Rack 4 topology updated to allow umbilical installation, and concurrent operation of 2 ARCTICs for STELSYS operations
    - 2nd ARCTIC required due to BTR on-orbit partial failure during Increment 4

- **Renal Stone operations in Russian segment still not approved**
  - Approval plan between US and Russia defined and in work
    - First collection scheduled for week 3
    - Workaround to perform in US segment done on Increment 4

# Canadian Space Agency (CSA)

# Flight UF-2 FRR

CSA/William A. Mackey

May 16, 2002

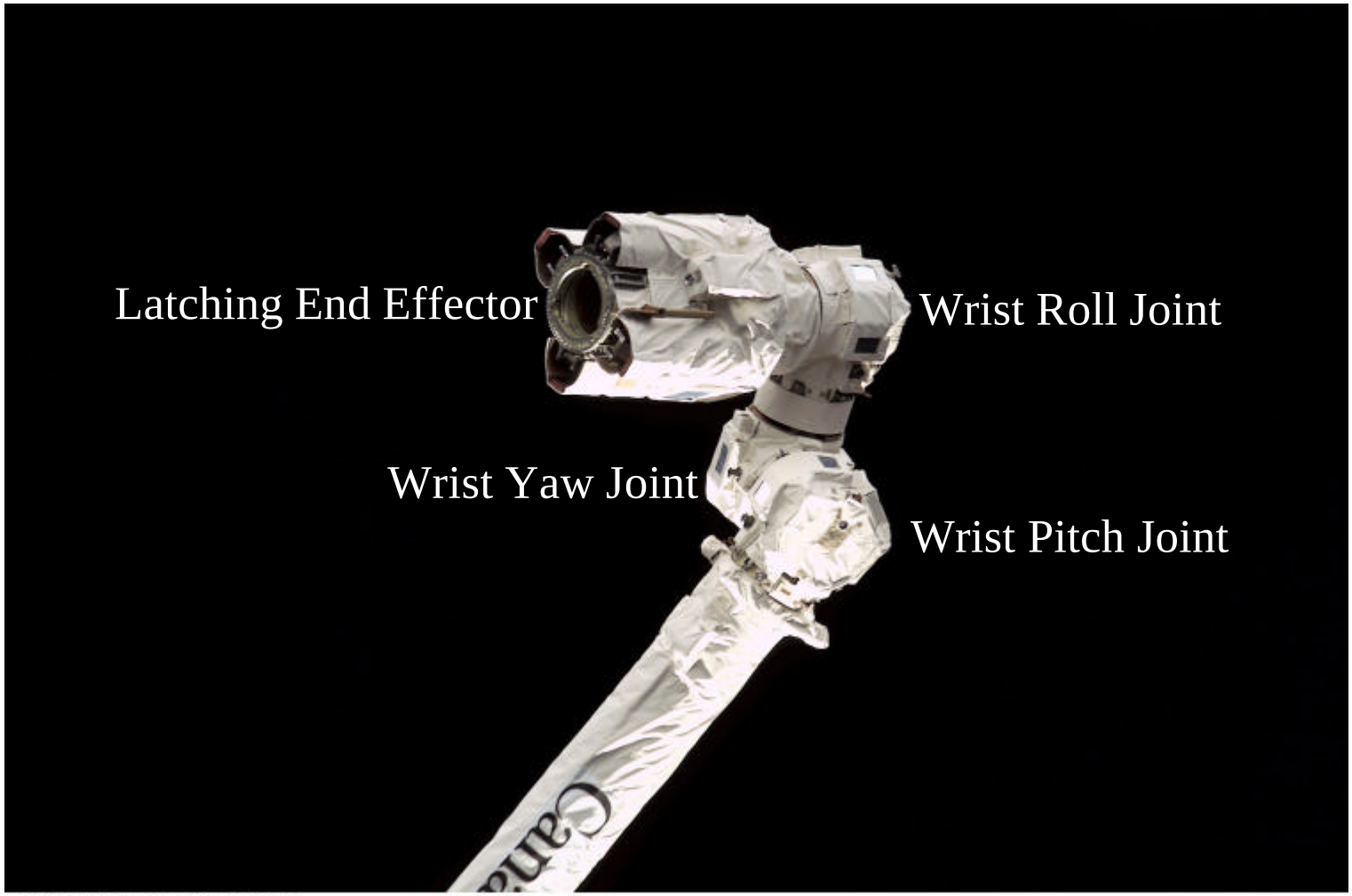
# MSS Status

- **Nominal Systems:**
  - Canadarm2 Redundant String fully functional with 7-DOF software
  - Lab RWS fully functional with 3 video monitors
  - MSS Base System (MBS) installed in the payload bay
- **Degraded Systems:**
  - Canadarm2 Prime String functional without Wrist Roll Joint with 6-DOF software
  - Cupola RWS fully functional with 2 video monitors and an AVU monitor (LCDM)
- **MSS Anomalies/IFI's with Possible UF-2 Timeline Impact (Recoverable):**
  - MER IFI 708 – SSRMS WR Brake Bus Fault (Prime) - Closed (6-DOF Patch)
  - MER IFI 711 – Incorrect Assignment of SSRMS Camera Address
  - MER IFI 715 – Cupola RWS Assert Active Failed
- **MSS Anomalies/IFI's Impacting Flight UF-2:**
  - None

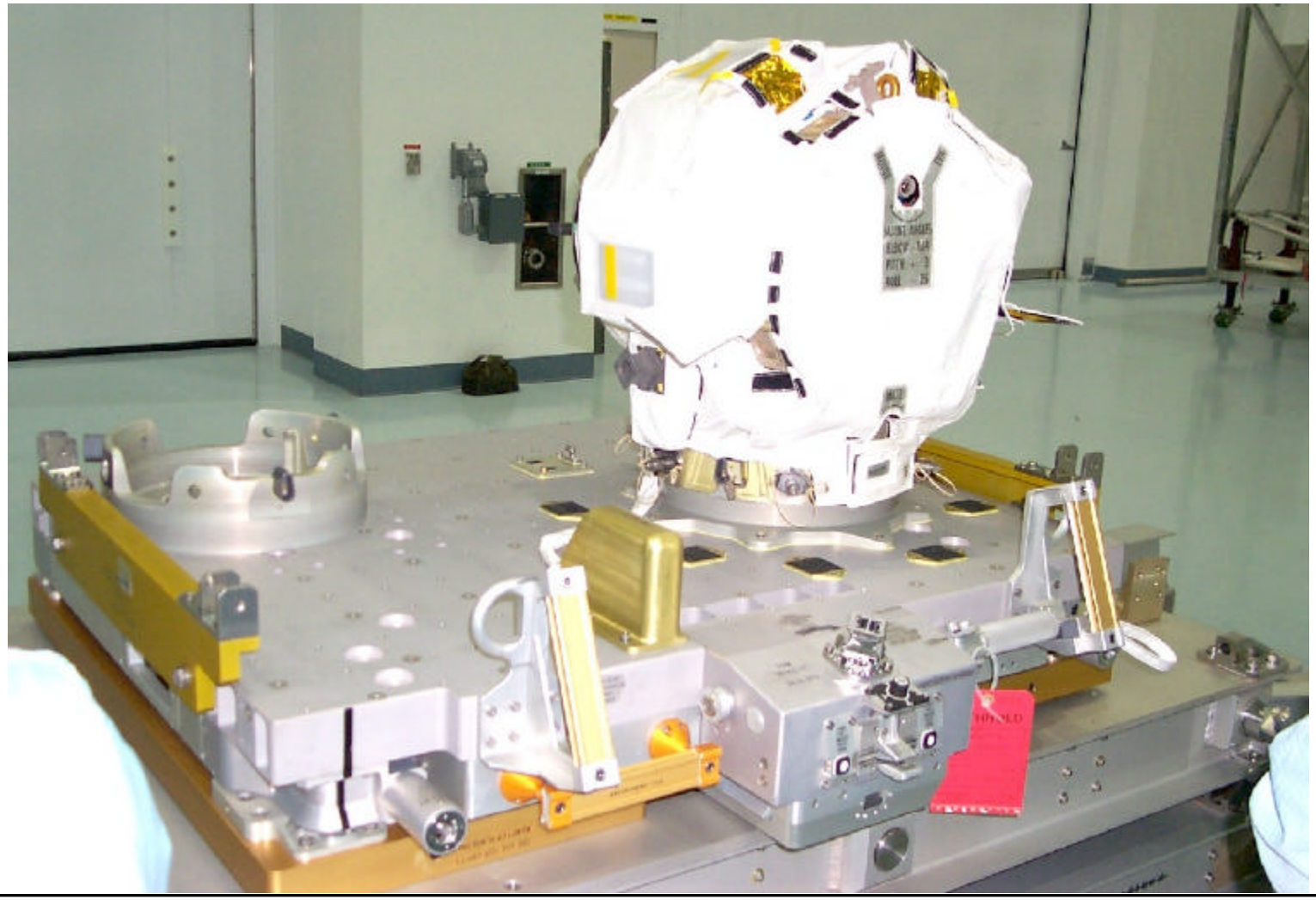
# Canadarm2 WR Joint Anomaly

- On Day 064 GMT (3/5/02) during UF-1 Stage, Canadarm2 Wrist Roll (WR) joint failed on Prime String. This was/is a persistent failure preventing brakes release.
- Root cause was identified as either an internal WR joint short or brake bus noise.
- Flight 8A SORR Exception #004 resulted in a software patch that overrides the failed joint and allows Canadarm2 to function without wrist roll motion using the remaining 6 joints.
- This “6-DOF” capability was exercised on-orbit prior to 8A and UF-2 (5/2/02) and is for operational contingencies if necessary.
- UF-2 Nominal Plan: Canadarm2 will perform EVA#1 support and then MBS Installation on Redundant string with full 7-DOF functionality.
- EVA drive and 6-DOF operations are available if required to unberth and position the MBS over the MT on FD05. MOD mission design plans for these contingencies.
- Planning to perform additional WR joint diagnostics with Diagnostic Patch for final on-orbit data gathering while in maintenance configuration prior to WR joint R&R.
- Wrist Roll (WR) Joint R&R will be performed on UF-2 EVA #3. Root cause determination will continue upon return.

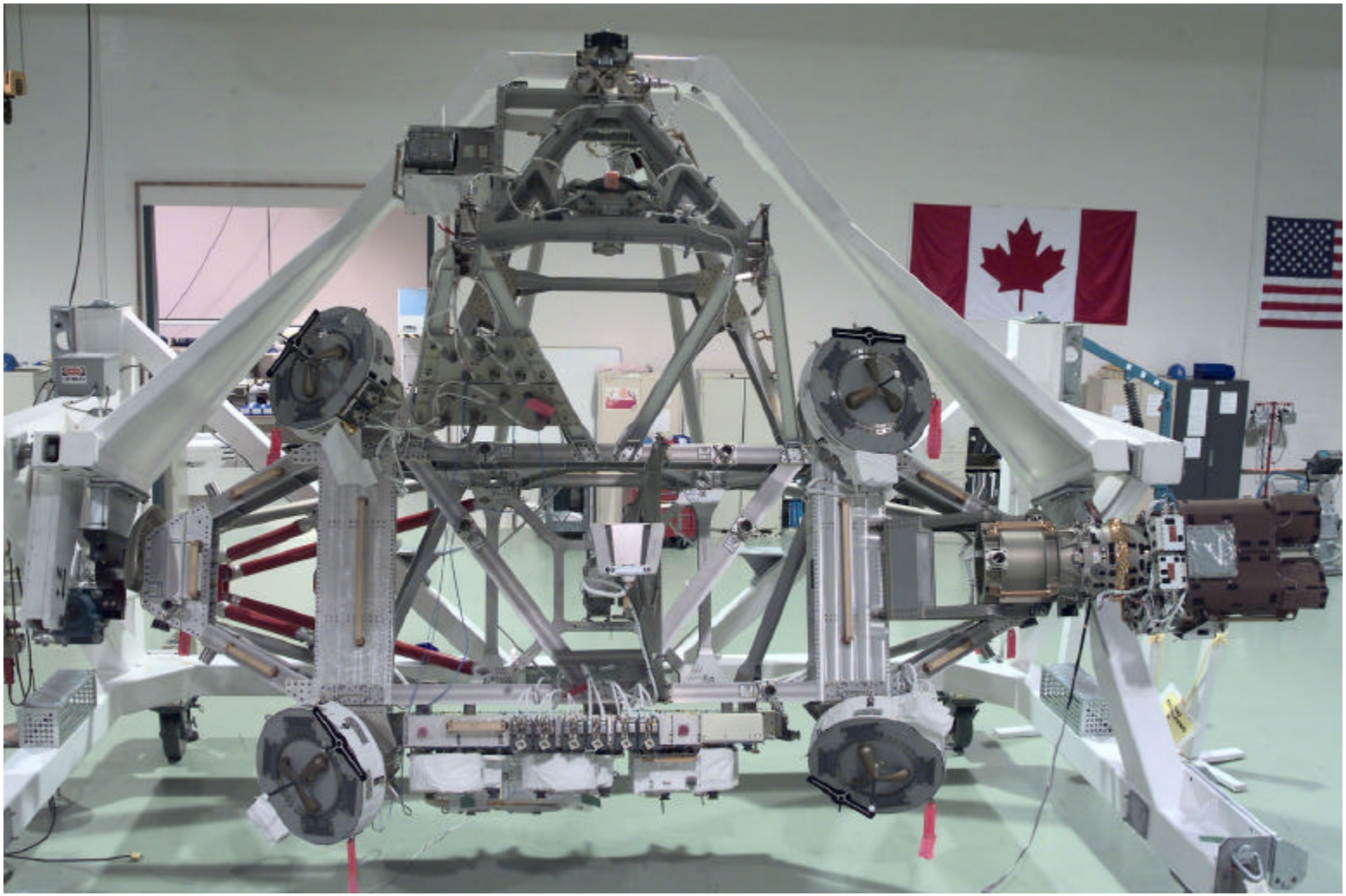
# Canadarm2 Wrist Cluster



# Wrist Roll (WR) Joint on FRAM



# MSS Base System (MBS)

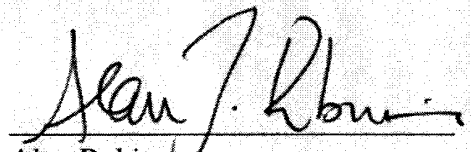


# Forward Work

- **Canadarm2 Readiness – No issues**
  - Robotics SODF Procedures Approval – 5/15/02
  - Complete Pre-launch Checkout of Canadarm2 – 5/28/02
  - Complete Degraded Joint Operations Patch for UF-2 Stage – 6/21/02
    - No constraint to Flight UF-2 nor to UF-2 Stage operations
- **WR Joint & FSE CoFR Complete – No issues**
  - Canadarm2 WR Joint R&R – EVA Readiness Review – 5/06/02
    - EVA FDF (Forms 482) Procedures Approval – 5/15/02
    - WR Joint R&R Off-Nominal Situations (ONSs) Approval – 5/23/02
    - Uplink the WR Joint Diagnostic Patch (~FD8 Ops) – 6/02/02
- **MBS CoFR Complete – No issues**
  - Close-out open MBS CoFR paper – 5/15/02

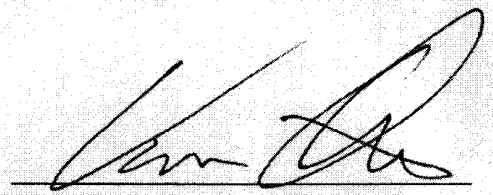
# Readiness Statement

Pending completion of the identified open work, the Canadian Space Agency is prepared to support Flight UF-2 and UF-2 stage operations.

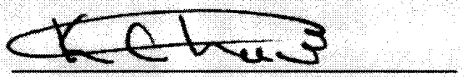


Alan Robins
System Engineering

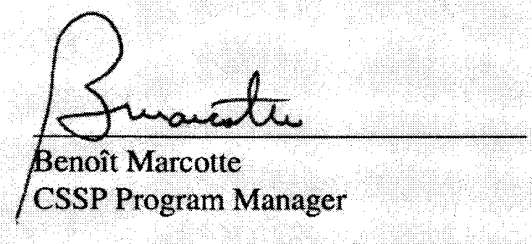
Ian Foster
Manager, Configuration Management



Victor Chang
Manager, Safety & Mission Assurance



Ken Lord
Deputy Director, Operations



Benoît Marcotte
CSSP Program Manager




# ISS-UF-2 International Space Station Program Summary
# May 16, 2002


# Summary



- Flight objectives and priorities are defined
- Flight manifest has been defined
- Hardware has been and/or will be delivered and installed to support launch date
- All hardware and software certifications are complete or will be complete prior to launch.
- Personnel and facilities are ready to support flight.
- Special topics have been resolved or have acceptable operational workarounds
- All open paperwork is closed.

**The ISS Program is ready to proceed with the launch of ISS UF-2/STS 111**




# Back Up Charts

- **Detailed Flight Priorities**
- **Waivers & Deviations**


# Detailed UF-2 Flight Priorities



1. Rotate Expedition 4 crew with Expedition 5 crew, transfer mandatory crew rotation equipment and perform mandatory tasks consisting of: IELK install, Sokol suit checkout, and the safety
2. Transfer water of mandatory quantities from Shuttle to ISS
3. Berth MPLM to Node 1 (using the Shuttle Remote Manipulator System (SRMS)). and MBS Unberth
4. Transfer launch manifest items from MPLM & shuttle middeck
5. Remove Mobile Remote Servicer (MRS) Base System (MBS) from Payload Bay (PLB) and provide keep-alive power
6. Return MPLM to Payload Bay (PLB) (using SRMS).
7. Perform minimum crew handover of 12 hours per crewmember
8. Perform SSRMS Wrist Roll (WR) joint transfer.
9. Remove from the sidewall carrier, transfer using SSRMS, and temporarily stow the set of six Service Module Debris Panels (SMDPs) on the Pressurized Mating Adapter (PMA)-1.
10. Remove from sidewall carrier, transfer using SSRMS, and install the Power and Data Grapple Fixture (PDGF) on Port (P)6.
11. Transfer and return **Layer I** items
12. Activate, complete MBS checkout, and install MBS to Mobile Transporter (MT).
13. Perform SSRMS Wrist Roll (WR) joint removal and replace (R&R) activity.
14. Transfer MPLM & middeck items (**Layer II – Return**)
15. Complete MBS outfitting.
16. Perform Internal Thermal Control System (ITCS) coolant sampling


# Detailed UF-2 Flight Priorities



17. Perform Biomass Production System (BPS) mandatory science in support of payload return.
18. The Advanced Astroculture (ADVASC) experiment H/W requires transfer and activation on ISS within 20 - 24 days after the H/W turnover to Kennedy Space Center (KSC) for installation. This requirement will result in a joint operational activity to install the H/W in the appropriate EXPRESS rack on-orbit if there is a launch slip of more than 5 days. If the launch is on the 6th day, activation must take place no later than FD10. If the launch slips beyond 6 days, then the activation must take place one day earlier for each additional day slipped. This is due to H/W turnover at Launch minus (L-) 8 days for MPLM installation.
19. Transfer MPLM & middeck items
20. Perform Russian HDTV experiment
21. Perform necessary setup and transfer oxygen ($O_2$) if available, and Nitrogen ($N_2$) from Shuttle to ISS (target quantities identified in Table 5.0-1, to be updated per real-time needs and capabilities).
22. Perform ISS reboost for a minimum of 3 hours.
23. Increment 5 crew and returning Increment 4 crew will perform pill ingestion daily to support Human Research Facility (HRF) renal science data collections.
24. Perform SDTO 15004-U, ISS Control of Partial Pressure of Carbon Dioxide Levels in the Space Shuttle to Reduce Shuttle LiOH Usage. (Per SDTO Catalog SSP 50448.)
25. Perform additional 4 hours per crewmember of ISS crew handover (16 hours per crewmember total)
26. Perform EVA Radiation Monitoring (EVARM) experiment activities. If times permits.


# Detailed UF-2 Flight Priorities



27. Perform mandatory maintenance daily activities for powered middeck and US Lab payloads per the following EIA addenda: BPS, Commercial Generic Bioprocessing Apparatus (CGBA), Commercial Protein Crystal Growth - High Density (CPCG-H), Dynamically Controlled Protein Crystal Growth (DCPCG), and Protein Crystal Growth - Single Thermal Enclosure System (PCG-STES), Commercial Refrigerator Incubator Module - Commercial Stelsys (CRIM-CS). Perform Biomass Production System (BPS) mandatory science in support of payload return.
28. Perform imagery survey of the ISS exterior during Orbiter flyaround after undock
29. Perform ISS reboost to the maximum average orbital altitude possible, to minimize the required amount of UF-2 Stage reboost


# UF2 Approved Waivers



| CHANGE ID | TITLE | CHANGE APPROVAL | REMARKS | FLIGHT EFFECTIVITY |
|---|---|---|---|---|
| SSCN 6372 | Waive WS&A Requirement for Collection of Condensate Samples in Russian Segment for UF-2 Kit | GCB/OSB 01/29/02 | For the Water Sampler & Archiver (WS&A) P/N SEG46115816-301 S/N 1002 launching on UF-2, waive the SSP 50470 CHeCS GFE Specification Rev. A requirement in Paragraph 3.2.1.28.2 Interface with Russian Segment Water Systems calling for "collection of condensate samples." To sample Russian Water System condensate (filter reactor effluent) water, the Condensate Sampling Subpack P/N SEG46113538-301 nominally includes 2 Condensate Sampling Interface Assemblies P/N SED46114380-301. The 4 Russian supplied hydroconnectors (connector valve and connector) used to assemble the Condensate Sampling Interface Assembly have exceeded the manufacturer's warranty per the Passports, and no additional hydroconnectors have been supplied. The WS&A will launch on UF-2 without the 2 Condensate Sampling Interfaces in the Condensate Sampling Subpack to meet the required delivery date for flight of 2/01/02. This waiver will have no impact on capability to fulfill requirements for potable water sampling in both the U.S. and Russian segments. | UF-2 |
| SSCN 6430 | Waiver of Contingency Resistive Exercise System (CRES) Kit Assembly Configuration for UF2 | GCB 02/21/02 | Waive the currently authorized kit configuration (-302) to allow addition of elastic straps. In order to accomodate a late crew request, the CRES Kit (P/N SEG46117220-302) flight unit delivered for UF-2 (S/N 1002) was modified to add two elastic restraint straps. The configuration difference was documented on a discrepancy report (DR) which was added to the unit's Acceptance Data Package (ADP). Upon return from flight the hardware will be permantly updgraded to a new configuration (-303) as authorized by a previously submittted CR. | UF-2 |
| SSCN 6472 | Request for Waiver: Active Rack Isolation System (ARIS) Controller Power Supply Workmanship Requirements | VSIP 03/11/02 | The Active Rack Isolation System (ARIS) (Configuration Item [CI] No 683L55A) Controller Power Supply (Part Number [P/N] 683-61700-1) manufactured by Modular Devices Inc. (MDI) and installed in the ARIS Controller (P/N 683-61566-1) does not meet the Workmanship Requirements of D683-29350-1 as invoked by the United States On-orbit Segment (USOS) Prime Item Development Specification (PIDS) Space Station Program (SSP) 41162. | UF-2 |


# UF2 Approved Waivers



| CHANGE ID | TITLE | CHANGE APPROVAL | REMARKS | FLIGHT EFFECTIVITY |
|---|---|---|---|---|
| SSCN 6609 | Request for Waiver: External Television Camera Group (ETVCG) Color Burst Amplitude and Internal Cable Loss | ASCB 04/10/02 | The NASA controlled requirement [reference SSP 50002 paragraph 3.2.1.1.5] for the ETVCG, L-3 Communications Systems (L-3) Part Number (P/N) 10033194-501, Serial Numbers (S/Ns) 002, 003, and 005, to provide a minimum color burst amplitude of 38.0 Institute of Radio Engineers (IRE) and invoked by L-3's ETVCG Prime Item Development Specification 10033124 paragraphs 3.2.1.2.6[1] and 3.7.1.1.1.1.1[1] will be waived. (Reference L-3 Waiver Requests W-11447-367R1 and W-11447-364). | UF-2 |
| SSCN 6621 | Waiver for UF2 TOCA Supply Kit and on-orbit life extension | GCB 04/04/02 | Deletion of the following items from the TOCA Supply Kit, P/N SEG46116007-303, for UF2:<br>1. Test Sample Sysringe Subpack Assembly, P/N KLST400038-305<br>2. Consumables Subpack Assembly, P/N KLST400040-302<br>3. Replacement Waste Containers, P/N KLST400042-30<br>4. Miscellaneous Items: Power Cable P/N KLST400068-301, Data Cables RS-232 P/N KLST 400069-301, Wash Cloth P/N 528-40806-1, Log Book P/N KLST400024-301, Marking Pens P/N KLSi240842-701, TOCA Syringe Adapters Assembly, P/N WLST400124-301<br>5. TOCA Syringe Subpack, P/N KLST400038-304 | UF-2 |
| SSCN 6710 | Request for Waiver – PFRAM Adaptor Plate Open Reconciliation | PICB 05/03/02 | Obtain authorization to fly UF-2 with open, deferred reconciliation. The 683-96185-001 NC Mod Kit was not completely satisfied for UF-2. The 683-96180-001 Rev A change was not completely satisfied. The As-Built and As-Designed baselines are in conflict. | UF-2 |


# UF2 Pending Waivers



| CHANGE ID | TITLE | REMARKS | FLIGHT EFFECTIVITY |
|---|---|---|---|
| SSCN 6714 | Request for Waiver – Insufficient Configuration Traceability Data for Flight UF-2 Items | 1. Boeing is unable to completely satisfy applicable configuration traceability requirements due to insufficient as-built documentation of Serial Number (S/N) data.<br>2. Boeing unable to verify current configuration due to post delivery change to engineering<br><br>1J00520-001 Passive Fram Installation Kit (No CI number assigned). | UF-2 & ON |
| SSCN 6747 | Improve Mechanical Attachment System of ASI Logo to MPLM and Request for Waiver – Authorization to Fly MPLM 1, UF2 with As-Designed vs As-Built differences | 1) Improve Mechanical Attachment System of ASI Logo to MPLM. Request authorization to design and implement an improved ASI Emblem mechanical attachment system.<br>2) Request for Waiver – Authorization to Fly MPLM 1, UF2 with As-Designed Vs As-Built differences. | UF-2 |

# Back-up

# On-Orbit Readiness

# Current On-Orbit Status

- C&DH
  - All Station MDMs operational
    - Node - N1-2 primary, N1-1 secondary
    - Lab
      - C&C 1 standby, C&C 2 backup, C&C 3 primary
      - INT systems 1 operating, INT systems 2 off
      - Lab Aft 1 – on; Lab Aft 2, 3 - operating
      - Power Management Controller Unit (PMCU) 1 off, PMCU 2 on
      - GNC 1 primary, GNC 2 backup
      - Payload 1 primary, PL 2 off
    - Airlock MDM - operating
    - Photovoltaic Control Unit (PVCU) - 2B backup, 4B primary
    - Power Mgmt Controller Unit (PMCU) – PMCU-1 operating; PMCU-2 off
    - S0
      - EXT 1 – primary, EXT 2 – off
      - S0-1; S0-2 - operating
    - FGB - 1 operating, 2 off
    - SM - Loaded with version 5.0 software
      - SMTCs - all in redundant set
      - SMCCs – SMCC-1 operating; SMCC-2 primary; SMCC-3 out of set

# Current On-Orbit Status
## (continued)

- C&T
  - S-band high/low data rate operating nominally
  - Ku band operating nominally
  - MCOR not operating (TBR)
  - SM Regul System operating on 1 of 3 strings
  - Audio system
    - Internal Audio Controller (IAC) 2 active, IAC-1 off
    - Have occasional P-bits on audio equipment
  - SM Kurs set #2 has intermittent failures – no impact

# Current On-Orbit Status
## (continued)

- ECLS
  - Lab ECLS systems operating nominally except for the CDRA and MCA
    - CDRA operates on a single-bed (when required)
    - MCA Mass Spec and Verification Gas Assembly to be R&R'd
  - Node smoke detector #2 R&R'd but system not yet operational
  - SM Vozdukh operating on 2 of 3 CO2 removal beds
    - CO2 removal capability nominal
    - Second vacuum pump starting to fail
  - SM Air conditioners (SKV) #1 and #2 operational.
    - SVK #2 in use
  - SM rapid depress response inhibited
    - Russian have recently been enabling the algorithm during the crew day
    - Low pressure warning enabled
    - U.S. Lab rapid depress response enabled

# Current On-Orbit Status
## (continued)

- EPS
  - FGB EPS working nominally
    - 5 of 6 batteries on-line
  - SM EPS working nominally
    - 7 of 8 batteries on-line
  - P6 power channels 2B and 4B operating nominally
    - 2B and 4B rotated as required for power
  - RPCMs
    - RPCMs LAD22B-A, LAFWD-1B-A, and LAFWD-1B-C have bit flips on SRAM and cannot be refreshed.
      - No short term impact
      - Spares available, if required
  - SM ARCU #23 declared failed. Russians planning to R&R on May 14th

# Current On-Orbit Status
## (continued)

- S&M
  - 2B and 4B BGA showing high currents sporadically
    - When in XVV, 4B in directed position (to limit use), 2B in autotrack
    - Low **b** X-POP being pursued to limit BGA rotations
  - Impact mark on SM window #7
  - 3 of 4 Beta Gimbal Assembly (BGA) latching mechanisms locked on starboard 4 Bar assembly
    - Latched port 4 Bar assembly on 5A.1
    - Strength analysis shows 3 of 4 acceptable for near term

# Current On-Orbit Status
## (continued)

- TCS
  - Early external active thermal control system operating within specs
    - Starboard radiator has one loop plumbed incorrectly
      - Heat rejection capability impacted - still meets current heat rejection needs
  - ITCS operating nominally
    - ITCS fluid forward plan still in work

- EVR
  - CanadArm2 operating nominally except for WR prime string failure
    - WR to be R&R'd on UF-2
  - RWS has one monitor failed
    - Replacement to be flown on UF-2

# Current On-Orbit Status
## (continued)

- GN&C
  - All CMGs have experienced occasional loss of comm
  - CMG 2 gimbal bias (24.5 deg) in the outer gimbal corrected with software update

- Propulsion systems nominal and ready for UF-2 operations

# Current On-Orbit Status
## (continued)

- EV&CS/GFE Hardware
  - VOA (air sample analyzer) - sporadically operational
    - 3-4 month system validation process not started due to problems
  - TOCA (water sample analyzer) - validation in progress
  - TEPC (radiation monitor) - working
    - Experiences occasional downlink of data problems
  - Defibrillator - working
  - IRED, CEVIS - working
  - TVIS – operating restrictions in place
  - IV-CPDS - gives anomalous dose readings
    - Experiences occasional downlink of data problems
  - EV-CPDS – checkout in progress
  - Water Maintenance Kit (WMK) - “contamination” understood, kit useable

# BACKUP MATERIAL

# FRR Unplanned Open Work Status
# UF2

| | Actionee | Risk to Flight | Comments | SORR Inputs 3/19 | Wkly Rvw 3/26 | Wkly Rvw 4/2 | Wkly Rvw 4/9 | Wkly Rvw 4/16 | PCB Rvw 4/24 | SORR 5/7 | Wkly Rvw 5/14 | Wkly Rvw 5/21 | Wkly Rvw 5/28 | Launch 5/30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unplanned Open Work** | | | | | | | | | | | | | | |
| **SLS** | T. Goodwin | G | ARCTIC final fluid servicing and HDW T/O after fit check with new hose assy to close crew squawk (ECD: 5/24). Update documentation to require the 2 ARCTIC units during Stage operations to support Stelsys due to on-orbit BTR failure (ECD: 5/23). Update drawings to update accessory kit contents (ECD: 5/15). Close PIRNs (ECD: 5/24). | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | | | |
| | | Y | Fabrication and Delivery of new ARCTIC hose to conduct a fit check to close crew squawk (ECD: 5/22) Approval of revised Safety Package submitted on 5/7 to include new ARCTIC hose (ECD: 5/29). Update procedures to accommodate new ARCTIC Hose (ECD: 6/29). Complete drawings, certification, fabrication, and acceptance testing (ECD: 5/28) Delivery of HDW to support L- 10 day MDK bench review (ECD: 5/21). Final Fluid servicing for flight and HDW T/O to KSC (ECD: 6/24) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | | |
| **HSLSPO** | D. Baumann | G | | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | | | |
| | | Y | Approval for operations in the Russian Segment for Renal experiment but the PD and OZ have agreed to an operational workaround to perform in the US Lab. (ECD: L+2 weeks). Crewtime availability does not accommodated scheduling EVARM activieities in the Flight Plan, therefore the PD and OZ are in agreement that this item will only be referenced as a task to be perfromed as time permits. | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | | | |
| **MRPO - MSG HDW** | C. Gibson | G | Closure of 4 Integrated Flight SVTL which requires CoC Submit (ECD: 5/15). Memo to close 1 Phase III Integrated Safety Review Action Item was submitted 5/13 (ECD: 5/15) | 2 | 2 | 2 | 3 | 3 | 3 | 13 | 2 | | | |
| | | Y | Close SUBSSA & PFMI Sample Box Verification - 4 open items were submitted to OZ3 which results in a risk to operate on-orbit (ECD: 5/15) | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | | | |
| **MRPO - No MSG HDW** | C. Gibson | G | Update PCG-STES SRDS with closure of items on BiC Project Al Log (ECD: 5/24). Updates to Stelsys HDW Ph III Safety in review by PSRP (ECD: 5/15) MEPS drawings are in review and require IPLAT approval (ECD: 5/20). MEPS new materials used to fix previous leak from UF-1 HDW will not be certified until leak test sucessful after PCM are fabircated (ECD: 6/17). MEPS crew procedure updates aprroved (ECD: 5/20). MEPS Ph III GSR in PSRP review (ECD: 5/20). EXPPCS transfer procedure updates in review for approval (ECD: 6/16). | 2 | 2 | 2 | 2 | 2 | 2 | 8 | 7 | | | |
| | | Y | Phase III Safety for on-orbit HDW to support Stelsys submitted awaiting comments (ECD: 5/15). Certification extension of BSTC Revief Valve testing complete and CoC paperwork in work (ECD: 5/15) ADVASC re-open verification to accommodate adding parts to support plant view capability and increasing volume of samples resulting in documentation updates required. (ECD: 5/22). Letter required to PSRP that ADVASC re-flight status is unchanged after adding plant viewing HDW. (ECD: 5/16). | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | | | |

# FRR Unplanned Open Work Status
# UF2

| | Actionee | Risk to Flight | Comments | SORR Inputs 3/19 | Wkly Rvw 3/26 | Wkly Rvw 4/2 | Wkly Rvw 4/9 | Wkly Rvw 4/16 | PCB Rvw 4/24 | SORR 5/7 | Wkly Rvw 5/14 | Wkly Rvw 5/21 | Wkly Rvw 5/28 | Launch 5/30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unplanned Open Work** | | | | | | | | | | | | | | |
| **EXPRESS** | W. Schnieder | G | Closure of VDS (ECD: 5/17). EIA Updates to implement late manifest changes and topology updates due to on-orbit HDW failures (ECD: 5/23) Closure of SVTLs requires baselined crew procedures, and hazard reports closed for New Arctic Hose (ECD: 5/25). Update on-orbit dwgs due to topology updates to implement 2 ARCTIC units resulting from on-orbit HDW failures (ECD: 5/24). | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | | | |
| **PE&I** | V. Romero | G | | 8 | 8 | 8 | 6 | 6 | 3 | 0 | 0 | | | |
| | | Y | Verification Report completed 4/25 and remaining open verification is being tracked (ECD: 5/20) | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | | | |
| **KSC** | R. Kuczajda | G | Approval of the MPLM TGHR table for late pad stow & launch refurbishment requirments (ECD: 5/16). New request for a ER#6 fit check with ARCTIC after delivery of new umbilical (ECD: 5/17). | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | | | |
| **Fund. Bio** | E. Harmon & A. Moody | G | Close BPS PIRNs (ECD: 5/13). Replied to comments received on 4/22 regarding the KSC GN2 FRZ Flight Safety data package on 5/3 and closure by PSRP is reported for 5/17. | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | |
| **OZ2** | B. Pavlik | G | Update HRF and MSG PIA Addendums (ECD: 5/28) Close Safety - ARCTIC, KSC GN2 FZR, PCG-STES, Stelsys, MSG & ER#3, ADVASC, SAMS II (ECD: 5/20). Update MSG Panning/Operational Data Sets to implement deletion of HDW from ascent manifest or addition of HDW to descent manifest - MSG G-Limit, EXPPCS & MEPs (ECD: 5/28). Risk of MSG verification closeure prior to MSG late MPLM Pad Stow (ECD: 5/22). Implement additional late manifest requests to accommodate ARCTIC new hose and changing PD requirements (ECD: 5/28). Update payload launch and return stowage requirements to implement new ARCTIC HDW, deletions of MEPs samples (ECD: 5/28) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | | |
| **FPD** | R. Little | G | Documentation Updates required (ECD: 5/23) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | | |
| | | | **Total Unplanned Open Work** | **48** | **48** | **48** | **46** | **46** | **41** | **59** | **43** | **0** | **0** | |

# FRR Planned Open Work Status
# UF2

| | Actionee | Risk to Flight | Comments | SORR Inputs 3/19 | Wkly Rvw 3/26 | Wkly Rvw 4/2 | Wkly Rvw 4/9 | Wkly Rvw 4/16 | PCB Rvw 4/24 | SORR 5/7 | Wkly Rvw 5/14 | Wkly Rvw 5/21 | Wkly Rvw 5/28 | Launch NET 5/30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Planned Open Work** | | | | | | | | | | | | | | |
| **Code M** | W. Williams | G | Verification of final procedures (ECD: 5/15) | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | | | |
| **SLS** | T. Goodwin | G | ARCTIC HDW servicing and T/O at KSC (ECD: 5/24) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| **HSLSPO** | D. Baumann | G | All HDW T/O at KSC (ECD: 5/21). Submittal of Pre-flight OCRs to update the OOS (ECD: 5/17). HDW certification - Foot HDW (prepositionsfor Increment 6 operations) in work with NT to close paper work - currently no issues and no contraint to operations (ECD: 5/15). | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | | | |
| **MRPO - MSG Rack** | C. Gibson | G | Training certifications (ECD: 5/24). Complete MSG console handbook documentation (ECD: 5/10) | 20 | 20 | 20 | 20 | 20 | 13 | 3 | 2 | | | |
| **MRPO MSG HDW** | C. Gibson | G | Close SUBSA & PFMI Flight & Ground Safety VTL Items (sample ampoules) per delivery at KSC (ECD: 5/17). Complete PFMI & SUBSA console support documentation & ground support personnel training (ECD: 5/24). Install foam at KSC to SUBSA & PFMI sample box (ECD: 5/15). Delivery of Late Load PFMI & SUBSA Sample Box (ECD: 5/17). Complete pre-ship accceptance Review (ECD: 5/16). | 32 | 32 | 32 | 32 | 32 | 27 | 17 | 9 | | | |
| | | Y | | 4 | 4 | 4 | 4 | 4 | 1 | 0 | 0 | | | |
| **MRPO (No MSG HDW)** | C. Gibson | G | EXPRESS provide VRDS to PCG-STES PD (ECD: 5/15). PSRP approval memo of PCG-STES with pre-UF-1 ground anomaly corrective action letter (ECD: 5/15). Closure of PCG-STES Ground SVTL (ECD: 5/24). CCB approval of PCG-STES console Handbook (ECD: 5/15). Remaining items are associated with KSC activities to close SVTL at L-24 or L-9 day HDW T/O. | 46 | 46 | 46 | 46 | 46 | 41 | 20 | 18 | | | |
| | | Y | | 6 | 6 | 6 | 6 | 6 | 3 | 0 | 0 | | | |
| **EXPRESS** | W. Schnieder | G | PD VRDS (includes L-24 hour install work) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| **PE&I** | V. Romero | G | | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 0 | | | |
| **Fund. Bio** | A. Moody | G | KSC GN2 FRZ T/O for MDK late stowage & complete SVTL (ECD: 5/28) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | |
| **FPD** | R. Little | G | Cadre Tool veirification and validation (ECD: 5/20). Deliver MPV Library (ECD: 5/23/02). Cadre training/certification (ECD: 5/17). Incomplete remote interface testing (ECD: 5/17). | 15 | 15 | 12 | 12 | 8 | 8 | 7 | 4 | | | |
| | | Y | | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | | | |
| | | | **Total Planned Open Work** | **143** | **143** | **140** | **137** | **133** | **108** | **62** | **41** | **0** | **0** | |

# Backup Charts

# Operations Post-WRJ Anomaly

| Functional String & Software Load | Operational State Transition (Events) | Operational State Duration (Hours) | Brake Release (Events) | Brakes Released Duration (Hours) |
|---|---|---|---|---|
| Prime String (6-DOF) | 4 | 9.8 | 7 | 3.6 |
| Prime String (7-DOF) | 14 | 90.9 | 1 (2) | ~0.0 |
| Redundant String (7-DOF) | 14 | 108.7 | 30 | 32.4 |

Notes:
1. Data gathered from Day 65 (03/06/02) through Day 123 (05/03/02), i.e. 1389.1 hours.
2. Brakes released momentarily when the WR anomaly initially occurred.